**GRADE 8 MATH PACING CALENDAR 2016-17**

**Teacher: Ram Buenaventura**

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**Grading Policy:**

60% Quizzes / Tests / Projects

20% Homework

20% Classwork

**ASSESSMENT PERIOD 1 (September – November)**

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| **Domain** | **Cluster** | **CC Standard** | **CC Standard Language** | **Aspect(s) of Rigor** | **Parts of the Standard** |
| Expressions & Equations | 8.EE.A    Major  Work with radicals and integer exponents. | 8.EE.A.1 | Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27. | Procedural | Understand when two numerical expressions involving exponents are equivalent |
| Apply properties of exponents when multiplying or dividing terms with the same base. Know when properties are not applicable |
| 8.EE.A.3 | Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the  United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger. | Conceptual, Application | Students compare very small and/or very large quantities based on their representation in scientific notation. |
| Estimate quantities using scientific notation, converting between standard form and scientific notation |
| 8.EE.A.4 | Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. | Conceptual, Procedural | Add, subtract, multiply, and divide numbers written in scientific notation |
| Interpret scientific notation that has been generated by technology, i.e. calculators |
| Choose units of appropriate size for measures of very large or very small quantities, and express those amounts in scientific notation |
| Convert between decimal and scientific notation as needed when solving problems |
| 8.EE.B    Major  Understand the connections between proportional relationships, lines, and linear equations. | 8.EE.B.5 | Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.  For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. | Conceptual | Graph proportional relationships and interpret the slope of the graph as the unit rate |
| Application | Compare two proportional relationships, which may be presented in different ways, e.g. equation, graph, or verbal description |
| 8.EE.B.6 | Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. | Conceptual, Procedural | Use similar triangles to explain why the slope of a line graphed on the coordinate plane is consistent |
| Derive the equation y = mx + b from a graphed line, or y = mx in the case that the line goes through the origin |

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| **8th Grade Common Core Math Standards Guide** | | | | | | |
| **Domain** | **Cluster** | **CC Standard** | **CC Standard Language** | **Aspect(s) of Rigor** | **Parts of the Standard** |
| Geometry | 8.G.A    Major  Understand congruence and similarity using physical models, transparencies, or geometry software. | 8.G.A.1 | Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. | Conceptual | Understand and apply rotations, reflections and translations to lines, line segments, angles and shapes |
| Taking a line segment, verify that no rotation, reflection, translation or any combination thereof will alter the length of the line segment |
| Taking an angle, verify that no rotation, reflection, translation or any combination thereof will alter the measure of the angle |
| Taking a relationship between or among lines or line segments, verify that no rotation, reflection, translation or any combination thereof will alter the relationship between the lines or line segments as parallel or not parallel |
| 8.G.A.2 | Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. | Conceptual | Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations |
| Describe a sequence of transformations that exhibits congruence between two given congruent figures |
| 8.G.A.3 | Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. | Conceptual | Understand dilations as a non-rigid transformation that enlarges or reduces a figure according to a scale factor |
| Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures in terms of coordinates using quadrants and coordinates |

**ASSESSMENT PERIOD 2 (December-February)**

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| Expressions & Equations | 8.EE.B    Major  Understand the connections between proportional relationships, lines, and linear equations. | 8.EE.B.5 | Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.  For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. | Conceptual | Graph proportional relationships and interpret the slope of the graph as the unit rate |
| Application | Compare two proportional relationships, which may be presented in different ways, e.g. equation, graph, or verbal description |
| 8.EE.B.6 | Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. | Conceptual, Procedural | Use similar triangles to explain why the slope of a line graphed on the coordinate plane is consistent |
| Derive the equation y = mx + b from a graphed line, or y = mx in the case that the line goes through the origin |

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| 8.EE.C    Major  Analyze and solve linear equations and pairs of simultaneous linear equations. | 8.EE.  C.7a | Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). | Conceptual | Generate examples of a linear equation in one variable with one solution, many solutions and no solutions |
| Isolate the single variable in a linear equation |
| Understand the resulting form of the above transformation to indicate the solution type (infinite, many or one solution) |
| 8.EE.  C.7b | Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. | Procedural | Solve a linear equation with rational coefficients |
| Understand the representations of having one, infinite, or no solution |
| Identify linear equations in one variable with one, no, or infinite solutions by inspection |
| Identify linear equations in one variable with one, no, or infinite solutions by transforming given equations into simpler forms, ie using the distributive property and collecting like terms |
| Give examples of linear equations in one variable with one, no, or infinite solutions by inspection or simple transformation |

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| Geometry  Major  8.G.A.4 | Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. | Conceptual | Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations |
| Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them |
| Geometry  Major  8.G.A.5 | Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so. | Conceptual | Use arguments to show the sum of the interior angles of a triangle is 180 degrees and the exterior angles’ sum is 360 degrees |
| Use arguments to show the angle-angle criterion for similarity of triangles |
| Use arguments to show relationships between the angles made by a transversal through parallel lines |
| Use facts about angles of triangles and parallel lines in solving problems |

Review Standards:

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| 8.EE.A.3 | Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the  United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger. | Conceptual, Application | Students compare very small and/or very large quantities based on their representation in scientific notation. |
| Estimate quantities using scientific notation, converting between standard form and scientific notation |

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| 8.EE.A.4 | Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. | Conceptual, Procedural | Add, subtract, multiply, and divide numbers written in scientific notation |
| Interpret scientific notation that has been generated by technology, i.e. calculators |
| Choose units of appropriate size for measures of very large or very small quantities, and express those amounts in scientific notation |
| Convert between decimal and scientific notation as needed when solving problems |

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| 8.G.A.3 | Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. | Conceptual | Understand dilations as a non-rigid transformation that enlarges or reduces a figure according to a scale factor | |
| Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures in terms of coordinates using quadrants and coordinates |

**ASSESSMENT PERIOD 3 (March-May)**

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| Domain | Cluster | CC Standard | CC Standard Language | Aspect(s) of Rigor | Parts of the Standard |
| Expressions & Equations | 8.EE.C    Major  Analyze and solve linear equations and pairs of simultaneous linear equations. | 8.EE.C.8a | Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. | Conceptual | Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously |
| 8.EE.C.8b | Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x+2y=5and3x+2y=6havenosolutionbecause3x+2y cannot simultaneously be 5 and 6. | Conceptual, Procedural | Solve systems of linear equations in up to two variables |
| Estimate solutions to systems of linear equations visually on graphs |
| Solve simple cases by inspection |
| 8.EE.C.8c | Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. | Procedural, Application | Solve systems of linear equations in up to two variables |
| Estimate solutions to systems of linear equations visually on graphs |
| Solve simple systems of equations by inspection |
| Understand that solutions to a system of linear equations correspond to the points of intersection of their graphs |
| Solve real-world and mathematical problems leading to systems of linear equations |

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| Domain | Cluster | CC Standard | CC Standard Language | Aspect(s) of Rigor | Parts of the Standard |
| Functions | 8.F.A    Major  Define, evaluate, and compare functions. | 8.F.A.1 | Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (8.F.A.1 footnote: Function notation is not required in Grade 8.) | Conceptual | Understand that a function is a relationship that assigns exactly one output to every input |
| Understand the graph of a function as the set of ordered pairs, (x, y), consisting of an input, x, and its corresponding output, y |
| 8.F.A.2 | Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. | Conceptual | Analyze different representations of functions for properties of the function, including initial value and rate of change |
| Compare properties of two functions each represented in a different way |
| Interpret a property of a function or a comparison of properties in the context of the function |
| 8.F.A.3 | Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s^2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line. | Conceptual | Interpret the equation y = mx + b as a linear function. Know that the graph of a linear function is a straight line |
| Recognize and give examples of functions that are or are not linear |
| 8.F.B    Major  Use functions to model relationships between quantities. | 8.F.B.4 | Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. | Conceptual, Application | Model a relationship between two quantities by constructing a function |
| Determine the rate of change and initial value of a function from a relationship. The relationship may be given as a description, two coordinate values, a table, or a graph |
| Interpret the rate of change and initial value of a linear function in the context of the situation it models |
| 8.F.B.5 | Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. | Conceptual, Application | Qualitatively describe the relationship between two quantities by analyzing the graph of a function that relates the two quantities |
| Sketch by hand a graph that exhibits particular features that are described verbally |
| Interpret the rate of change and initial value of a linear function in the context of the situation it models |

Review Standards:

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| 8.EE.B.5 | Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.  For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. | Conceptual | Graph proportional relationships and interpret the slope of the graph as the unit rate |
| Application | Compare two proportional relationships, which may be presented in different ways, e.g. equation, graph, or verbal description |

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| Domain | Cluster | CC Standard | CC Standard Language | Aspect(s) of Rigor | Parts of the Standard |
| Expressions & Equations | 8.EE.C    Major  Analyze and solve linear equations and pairs of simultaneous linear equations. | 8.EE.C.7a | Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). | Conceptual | Generate examples of a linear equation in one variable with one solution, many solutions and no solutions |
| Isolate the single variable in a linear equation |
| Understand the resulting form of the above transformation to indicate the solution type (infinite, many or one solution) |
| 8.EE.C.7b | Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. | Procedural | Solve a linear equation with rational coefficients |
| Understand the representations of having one, infinite, or no solution |
| Identify linear equations in one variable with one, no, or infinite solutions by inspection |
| Identify linear equations in one variable with one, no, or infinite solutions by transforming given equations into simpler forms, ie using the distributive property and collecting like terms |
| Give examples of linear equations in one variable with one, no, or infinite solutions by inspection or simple transformation |

**ASSESSMENT PERIOD 4 (June)**

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| 8.EE.A.2 Major | Use square root and cube root symbols to represent solutions to equations of the form x^2 = p and x^3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that sqrt(2) is irrational. | Conceptual, Procedural | Know that the square root of 2 is irrational |
| Represent the solutions of simple quadratic and cubic expressions by using square and cube roots |
| Recognize and evaluate the roots of perfect squares and cubes |
| Know and apply properties of roots to include negative solutions when appropriate |

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| Geometry | 8.G.B    Major  Understand and apply the Pythagorean Theorem. | 8.G.B.6 | Explain a proof of the Pythagorean Theorem and its converse. | Conceptual | Explain a proof of the Pythagorean Theorem |
| Explain a proof of the converse of the Pythagorean Theorem, and use the converse to show whether a triangle is a right triangle |
| 8.G.B.7 | Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. | Procedural, Application | Use the Pythagorean Theorem to solve for an unknown hypotenuse length given both adjacent side lengths in both two and three dimensions in a real-world and mathematical problem |
| Use the Pythagorean Theorem to solve for an unknown adjacent side length given given one adjacent side length and the length of the hypotenuse in both two and three dimensions in a real-world and mathematical problem |
| 8.G.B.8 | Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. | Procedural, Application | Use the Pythagorean Theorem to solve for the distance between two points in a coordinate system that corresponds with the hypotenuse of a right triangle in a real-world and mathematical problem |
| Use the Pythagorean Theorem to solve for the distance between two points in a coordinate system that corresponds with an adjacent side of a right triangle in a real-world and mathematical problem |

Supporting

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| The Number System | 8.NS.A    Supporting  Know that there are numbers that are not rational, and approximate them by rational numbers. | 8.NS.A.1 | Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. | Conceptual, Procedural | Understand a rational number to be any number that is the value of a ratio of two integers |
| Know that numbers that are not rational are called irrational |
| Understand that every number has a decimal expansion |
| Demonstrate that rational numbers expressed as decimals either terminate or repeat eventually |
| Convert a decimal expansion which repeats eventually into a rational number |
| 8.NS.A.2 | Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., pi^2). For example, by truncating the decimal expansion of sqrt(2), show that sqrt(2) is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. | Conceptual | Generate rational approximations of irrational numbers and locate them on a number line |
| Estimate the value of expressions (e.g. pi ^2) to a given degree of precision |
| Explain how to approximate irrational numbers with better precision |

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| Statistics & Probability | 8.SP.A    Supporting  Investigate patterns of association in bivariate data. | 8.SP.A.3 | Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. | Application | Use the equation of a linear model (line of best fit) to solve problems in the context of the data set; interpret the meaning of the slope and intercepts of the linear model |
| 8.SP.A.4 | Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores? | Conceptual, Application | Understand that two-way tables can be used to to show associations in bivariate categorical data |
| Construct a two-way table given a data set |
| Interpret a two-way table to summarize the data |
| Calculate and use relative frequencies to describe the association between the variables |

Additional

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| 8.G.C.  o  Additional  Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. | 8.G.C.9 | Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real world and mathematical problems. | Conceptual, Procedural, Application | Know and apply the formulas for the volume of cones, cylinders, and spheres to real-world and mathematical problems |

Review Standards

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| 8.EE.A.1 | Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27. | Procedural | Understand when two numerical expressions involving exponents are equivalent |
| Apply properties of exponents when multiplying or dividing terms with the same base. Know when properties are not applicable |

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| 8.EE.C.8c | Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. | Procedural, Application | Solve systems of linear equations in up to two variables |
| Estimate solutions to systems of linear equations visually on graphs |
| Solve simple systems of equations by inspection |
| Understand that solutions to a system of linear equations correspond to the points of intersection of their graphs |
| Solve real-world and mathematical problems leading to systems of linear equations |

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| 8.F.A.2 | Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. | Conceptual | Analyze different representations of functions for properties of the function, including initial value and rate of change |
| Compare properties of two functions each represented in a different way |
| Interpret a property of a function or a comparison of properties in the context of the function |

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| 8.F.B.4 | Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. | Conceptual, Application | Model a relationship between two quantities by constructing a function |
| Determine the rate of change and initial value of a function from a relationship. The relationship may be given as a description, two coordinate values, a table, or a graph |
| Interpret the rate of change and initial value of a linear function in the context of the situation it models |